

# **Applying a Systemic Approach to Gender Transport Poverty: Pakistan in Context**

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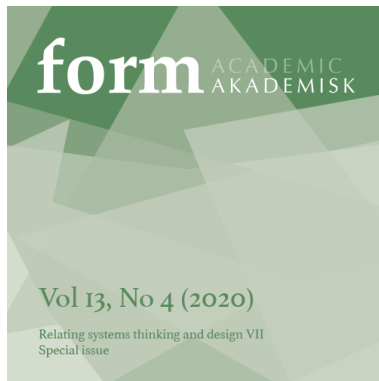
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# Applying a Systemic Approach to Gender Transport Poverty

## Pakistan in Context

### **ABSTRACT**

*Transport poverty and the associated levels of deprivation experienced by women is a 'wicked problem'. A systemic approach is needed to address entrenched societal and cultural norms that deprive women of equality and agency. The conceptual shift from 'transport' to 'mobility', emphasising access to life opportunities, provides an opportunity for more systems approaches to be tried. The 'WEMOBILE project' addressed gender transport poverty in Low-Middle-Income Countries using ethnographic and empathic design approaches to understand and re(present) the effects of gender transport poverty. This article focusses on insights provided by employing a systemic design to data gathered in Pakistan. In representing data as system maps, gaps that hinder the effectiveness of existing solutions are emphasised as well as the usefulness of this approach in highlighting opportunities for policy and operational changes.*

### *Keywords:*

Empathy, gender-sensitive transport, systems-thinking, Low-Middle-Income Countries, Pakistan.

### **INTRODUCTION**

The work of the Research Council (RCUK)-funded WEMOBILE project aimed to investigate gender transport poverty in Low-Middle-Income Countries (LMICs), such as Pakistan. This project addressed two of the UN's Global Goals for Sustainable Development:

- (i) achieve gender equality and empower all women and girls;
- (ii) make cities inclusive, safe, resilient and sustainable.

The international, all female research team from Pakistan, Malaysia, the UK and the US worked collaboratively to capture the everyday travel experiences of women in Pakistan to understand their mobility problems and how they are currently being addressed. The project took a design research approach, employing self-ethnography (Schwartz, 1989), empathic and qualitative design research, to develop new ways to articulate and represent barriers to women's mobility using a systemic synthesis. To the best of the authors' knowledge, this is the first time that a systemic approach has been applied to women's everyday mobility problems.

By way of context, transport has been widely recognised as having a male bias that is detrimental to women's mobility (Turnbull, 2013). This is one of the factors that makes gender transport poverty (Lucas, 2012) such a wicked (Rittel & Webber, 1973), multifaceted problem. These biases permeate all aspects of transport, from operation, planning and provision to the design of transport systems. For Europe, this is evidenced by the relatively low level (22%) of women in the transport workforce (ETF, 2018) and the underrepresentation of women in STEM subjects (only 24% of women graduate from Science, Technology, Education and Mathematics) (STEM, 2018). Hence, few women are equipped to deal with transport innovation or rise to senior, influential levels within transport and planning.

The situation in Pakistan, as an example of an LMIC, is very different. In comparison, labour force statistics for Pakistan show that, of the 5.67% total labour force employed in transport and storage (in 2017–2018), only 0.35% were women (Pakistan Bureau of Statistics, 2017). This means that it would be extremely unusual to find a woman working as a transport operator. In 2015, UNESCO (as quoted on the Pakistan Council for Science and Technology (PCST) web site) found that only 15.4% of the researchers in engineering and technology were women. PCST recognised the need for a national survey of women in science and technology. Gender employment imbalances across the sector indicate that women's mobility is not being considered (UNCSW, 2014), as it is beyond the understanding and beneath the level of concern of those in the industry. Opinions expressed in interviews with senior transport stakeholders were not only dismissive of women's needs but even questioned their right to be in the public realm (Iqbal, 2020).

Despite national and international directives and schemes in LMICs to increase the educational qualifications of women (in all disciplines), women face immense barriers to employment following graduation. For example, in 2016, it was estimated that only 25% of Pakistani women who hold a degree work outside the home (Tanaka & Muziones, 2016). Indeed, socio-cultural barriers may prevent women from taking up any form of employment. Those who do work may not be considered 'respectable' and as bringing shame to their families. However, gaining permission to work is just the first problem working women must face. Their job opportunities are geographically restricted by transport provision, with cultural and societal norms restricting their use of certain modes of transport and time of travel. Further, regardless of whether a woman works or not, she will spend, on average, three times more hours a day in unpaid care and domestic work than men in LMICs (Chant, 2013; Evans, 2015). This equates to up to eight hours of extra work a day on top of paid employment. This limits women's available time for paid work, commuting, education and leisure and further reinforces gender-based socioeconomic disadvantages. One of the most significant barriers to any form of female employment in Pakistan is access to safe, affordable, secure and reliable transport (Tanaka & Muziones, 2016). Moreover, while such access is essential for women to achieve gender equality, it needs to be accompanied by many other measures as well.

Working in a male-dominated industry (e.g. transport) is especially challenging for reasons alluded to, for example, by Turnbull (2013), such as cultural stereotypes, legal restrictions on women's working times (which precludes them from nightwork), the lack of family-friendly working arrangements, the lack of facilities for females in the workplace and gender biases in human resource development policies. Organisational change, embracing gender mainstreaming, is widely advocated (e.g. in the ILO Policy on Gender Equality and Mainstreaming). However, this will take time. In the meantime, insufficient progress is being made to improve women's mobility and quality of life. Through the use of

ethnographic methods and system maps, the WEMOBILE project strives to find new ways of representing the reality of women's lives.

Globally, women do not experience the same mobility freedoms as men. For example, women face more harassment on transport and in public spaces (e.g. Madan & Nalia, 2016; Osmond & Woodcock, 2015; Thompson, 1993) and are more severely affected by road rage (Gil, 2018). Solutions to these problems include gender-segregated transport (e.g. Dunkel-Graglia, 2013; McLeod, 2018), zero tolerance of harassment on public transport, gender-aware planning (Rakodi, 1999) and products designed to increase awareness of the aggressor among others (Saul, 2017). Such solutions are valuable, but they do not address the underlying issues of gender transport poverty. In this article, we define how the elements of transport poverty (encompassing transport affordability, mobility and accessibility poverty and exposure to transport externalities) interact with gender. Gender transport poverty research (Lucas, 2012) acknowledges the disproportionate burdens placed on women (e.g. they earn less, have multiple roles and their mobility is restricted by social, cultural, and religious norms) and how they reduce their mobility.

Women in LMICs face significantly more mobility challenges and problems than men and their counterparts in other countries. Some of these issues were experienced and witnessed first-hand by the research team as participant observers (Kawulich, 2005) on accompanied field trips in Lahore with the first author. Such immersive experiences into different cultures are both insightful and essential for those wishing to advise on transport in developing nations' (Rand et al., 2011). The visiting team from the UK, Malaysia and the US was subjected to harassment in the public realm and mobility restrictions imposed by social, cultural and environmental factors. For example, we were not allowed out of the hotel unaccompanied, had to dress and act with utmost decorum (Humayun, 2019), were subjected to the male gaze (Nawaz, 2019) and had to be hypervigilant at all times — to avoid tripping on uneven pavement, provoking unwanted attention, colliding with traffic or becoming victims of casual crime. Figure 1 shows images outside the hotel in Lahore. The hotel was surrounded by concrete blocks, with armed guards searching vehicles picking up or dropping off guests. In addition, even if we had been able to walk, there was nowhere to go within walking distance.



**FIGURE 1.** Security at the hotel in Lahore (Photograph: WEMOBILE project, 2018)

Our observations, experiences and the anxiety felt by our hosts in taking Western women onto the street concurred with a survey conducted by the Centre of Economic Research in Pakistan. In that study, nearly 30% of respondents considered it 'extremely unsafe' for women to walk in their neighbourhood, and around 70% of male respondents discouraged 'female family members from taking public wagon services' (Sajjad et al., 2017). Anand and Tiwari (2006) stated that 'the nature of the entire transportation system of the city is then not only insensitive to the needs of women, but also actively disables accessibility and induces poverty'. Seedat et. al. (2013) added that walking on poorly maintained roads or footpaths and avoiding vehicles in urban areas is stressful and tiring due to environmental effects — overcrowding, temperature, humidity and pollution (Figures 2 to 7).



**FIGURE 2.** Poorly maintained pedestrian areas in Lahore (Photograph: WEMOBILE project, 2018)

The cultural, social and economic barriers prevalent in Pakistan prevent women's experiences from being shared, acknowledged, understood or addressed. For example, a working woman may not speak about harassment out of concern for her family, but also because it will be used as a reason to stop her from working; a working woman will be ashamed of her dishevelled appearance if she travels on public transport; she will be chastised as a woman of ill repute for working late; and she will pay more of her salary on private transport to be safe. On buses, women may be verbally and physically harassed by male passengers and drivers. With journeys sometimes exceeding one hour, overcrowding and no air-conditioning, women arrive at their destinations tired and dishevelled. Our hosts considered it too dangerous for themselves and us to make recordings on public transport or to use it at all.



**FIGURE 3.** Inside typical buses. Women are allocated just one-third of the space (Photograph: WEMOBILE project, 2018)

Inadequate and unsafe transport provision and cultural restrictions on the use of transport modes require women to take more expensive and longer journeys than men. For example:

- Working men can use a bus, car or motorbike. Women are socially forbidden to use motorbikes — a mode of transport favoured by men (Hoodbhoy, 2013) — as wind through clothing may lead to female body shapes being revealed. They can sit side-saddle as a passenger, but they are not required to wear a helmet, putting them in greater danger in crashes. Very few women drive (5%), and even fewer have access to a car.



- Only one-third of seating on buses is allocated to women, and most prefer to avoid buses due to harassment issues. Thus, where possible, women pay more for on-demand transport services, such as Careems.
- Women's travel at night is dangerous and socially unacceptable. Working late requires hiring an on-demand service or being accompanied home by a family member.
- Leisure and recreational trips are socially unacceptable. Permission may be denied, or chaperones may be required.



**FIGURE 4.** Women's use of transport in Lahore -sitting side saddle on a motorbike and sharing a rikshaw (Photograph: WEMOBILE project, 2018)

Rittel and Webber (1973) defined *wicked problems* as social or cultural problems that are difficult or impossible to solve, for example, because of incomplete or contradictory knowledge, the number of people and opinions involved, the substantial economic burden and the interconnectedness with other problems. Burns (2017) argued that such problems 'cannot be adequately comprehended in isolation from the broader system in which they are part'.

Based on the information above, it can be seen that many factors contribute to and make gender transport poverty in Pakistan a wicked problem. These include the male domination of the transport sector and the difficulties of gender mainstreaming; social, cultural and religious norms that inhibit women from working and entering the public realm; overall levels of transport poverty, which affect all citizens of Lahore, such as the lack and poor quality of buses, the lack of traffic regulations, poor safety and hygiene and the lack of route coverage; and the requirements placed on women to be responsible for all household duties (even if they are in full-time employment). Together, these factors increase the mobility challenges faced by women and reduce women's equality, denying them access to health care, recreational facilities and employment opportunities. These are systemic issues.

The lack of gender mainstreaming and awareness in policymaking bodies and transport service providers means that women transport users do not have a voice or anyone to understand and champion their right to mobility. Therefore, there is an urgent need to find new ways of presenting their problems so that they will be understood and resolved. Sustainable mobility, with its emphasis on accessibility and equality, stakeholder engagement and consideration of quality-of-life issues, provides an opportunity to increase gender awareness, representation and gender-sensitive transport. The first step is to provide an easily comprehensible representational structure of the issues. The following sections briefly introduce the WEMOBILE project and show indicative results before focussing on the systemic approach used in the data presented.



**FIGURE 5.** Typical transport after dark, mixed transport modes operating in a congested, unregulated road space in Lahore (Photograph: WEMOBILE project, 2018)

## THE WEMOBILE PROJECT

According to the United Nations, ‘sixty percent of the global population lives in Asia (4.4 billion)’ (United Nations, 2018). Therefore, understanding firsthand and sharing knowledge about the everyday lives of people in LMICs is essential in the development of context-sensitive innovations, such as in the field of transport (Adeel et al., 2014; Rand, 2011), recognising that not all LMICs are the same. While transport poverty has been conceptualised, measured and made a part of policymaking in many developed countries (Lucas, 2012), there have been few attempts to study it in developing countries, such as Pakistan.

Pakistan’s population as estimated by the 6th Population Housing Census of Pakistan in 2017 was estimated at 207.7 million, 51% of whom are men. The 2017 census showed Lahore (where the fieldwork took place) to be the second most populous city, with a population of 11.1 million people. Pakistan ranks 128th out of 182 on the Human Development Index (2010), 124th out of 155 on the Gender Development Index (2009), and 132nd out of 134 on the Global Gender Gap Report (2009). Men have a higher literacy rate and higher participation in the labour force: in the province of the Punjab, female participation was 27.8% (in 2014–5), with the male labour force at 69.4% (Punjab Government, 2018). The Punjab Gender Parity Report (2018) revealed that the total number of vehicles owned was 1,649,044 vehicles in 2017, out of which only ‘1% of vehicles were owned by women’, even though women held 5.2% of all licences. These statistics illustrate a gender gap in terms of employment and the ability to commute easily to the place of employment. The International Labour Office (2011) stated that:

...transport remains a neglected area among gender specialists and transport specialists are still reluctant to take on gender issues. Until this is done, the prospects for many women who live in areas characterized by poor physical accessibility and inadequate transport will remain poor. (International Labour Office. (2011, p. x)

WEMOBILE (<http://mymobilitymatters.org/>) was an 18-month, collaborative, international project between designers, planners and ergonomists from the UK, Pakistan and Malaysia, which concluded in 2019. It aimed to use empathic (Author3, 2015) and participatory design approaches to capture and (re)present the problems women in LMICs face in their everyday travel to enable policy designers and other stakeholders to understand women’s mobility problems in LMICs. The overall goals were to raise awareness of barriers to women’s mobility and their effects on access to employment, other opportunities and quality of life.

The objectives were met through targeted, knowledge exchange workshops and visits to the UK, Malaysia and Pakistan — to understand and experience cultural differences in women’s mobility; small-scale empathic and co-design activities with female transport users provided culturally specific, authentic experiences of the mobility problems faced by women. The site visits allowed participant observations in which the female research team pooled their expertise in conducting autoethnographic notes and images to develop more in-depth, richer data and gain first-hand experience of gender transport poverty. They experienced the activities of everyday living (e.g. public transport, walking down

the main street) in each country (Pakistan, Malaysia and the UK). This shifted the team's understanding from a 'felt sense' to a more profound 'felt experience', allowing them to reflect on cultural differences of gender equality in mobility.

The WEMOBILE project was timely given recent transport-related initiatives in Pakistan, which have started to show a need to address gender transport poverty in sustainable transport measures. For example, the PAKSTRAN project has looked at sustainable transport policy and mobility in rural access, with a particular focus on gender; the 'decent transport project pilot' looked at safer public transport for women by the ILO; and the Government of Punjab's planning department (TPU, established in 2011) has critical objectives to develop 'professionally' prepared, sustainable transport plans, with fundamental guiding principles of transparency, equity, honesty and integrity.

## METHODOLOGY

A blended approach to research methods was adopted to ensure that the context of the individual was viewed from several perspectives. This included an online survey, participant observation, auto-ethnography, focus group discussions and journey mapping to a world café. Data collection was challenging and made use of personal and professional networks, social media and snowball recruitment. Although potential participants were interested in the research and understood its importance, time was a precious commodity. Taking part in the study meant travelling long distances, taking a break from employment or household duties. Some women may not even have been permitted to attend our events. Data were collected through two participatory workshops (a world café and a focus group) with 30 participants, 15 ethnographic interviews and 47 online surveys. All methods focused on the personal narrative of voices that were often overlooked, discounted and/or ignored.

Empathic modelling is a design research approach that encourages researchers/designers to walk in the shoes of the people they are trying to understand. This approach brings the statistics 'alive' in that it transforms understanding from a 'felt sense' to a 'felt experience' to more fully support user-centred design outcomes. The team took photographs and discussed their experiences and insights as a multicultural team. Video recording was not considered safe due to high levels of crime, risks of provocation and escalation of harassment that we might be capturing.

Figure 6 shows extracts of visual ethnography at and near bus stops, with a member of our project team waiting for a bus (in the right-hand images). Bus stops are considered especially hazardous places for women. They are generally poorly lit and maintained. Women standing at bus stops can be subject to harassment and theft. In addition, walking to bus stops is problematic (see previous images) and may require crossing several lanes of traffic. Pedestrian bridges over the traffic are scarce and so hazardous that women will walk extra distances to avoid using them (Figure 7).



**FIGURE 6.** Waiting at bus stops in Lahore (Photograph: WEMOBILE project, 2018)

To develop a more nuanced understanding of barriers to women's mobility, phenomenological interviews (Bevan, 2014) were conducted with five women and other stakeholders, drawing on and extracting the commonality of the experience of women's mobility. The interviews, conducted in native languages, were based around the travel diaries of participants and aimed to reveal what was



experienced and what influenced their experience of the situation (in line with best practices in phenomenological research) (Cresswell, 2013). The results were translated and discussed with the rest of the team (Figure 8), enabling a more holistic picture of women's lives to be constructed when combined with participant observations, visual and autoethnography (Ellis et al., 2011; Marcus, 1995; Schwartz, 1989).



**FIGURE 7.** Pedestrian overpasses in Lahore (Photograph: WEMOBILE project, 2018)

A one-day multi-stakeholder world café (Brown, 2010) was held in a gallery with representatives from civic, government and academic sectors in Lahore to discuss issues of current concern (Figure 5). A world café is a collaborative workshop that brings together interested individuals who have experienced the issue in question and are well informed about it. By creating an engaging and democratic atmosphere, the café promotes a space to co-create and co-design solutions while ensuring the voices of all participants are heard equally (<http://www.theworldcafe.com/>; Klaiman & Guadarrama, 2016). Professional working women, homemakers, government representatives and women rights activists took part.



**FIGURE 8.** Sharing and discussing data from discussion groups, other projects and journey diaries (Photograph: WEMOBILE project, 2018)

The event included a symposium showcasing projects related to women's mobility, research and efforts by government, various organisations and groups in Pakistan working to improve women's mobility (See Figure 9). A moderated panel discussion took place with representatives from the Centre of Economic Research in Pakistan, Women-on-Wheels initiative, civic sector, Careem (an on-demand taxi service, similar to Uber) and the local government. Issues raised included local initiatives, barriers to the uptake of classes in motorcycling and car maintenance, Careems, equality laws, safety and harassment of women. Following this, the audience broke into small groups for themed discussions.

A quantitative online survey was also distributed using social media to inform the focus groups. Questions were related to modal choices, expenditures and satisfaction levels with ventilation,

cleanliness, the experience of public transport and factors that might prevent respondents from using it.

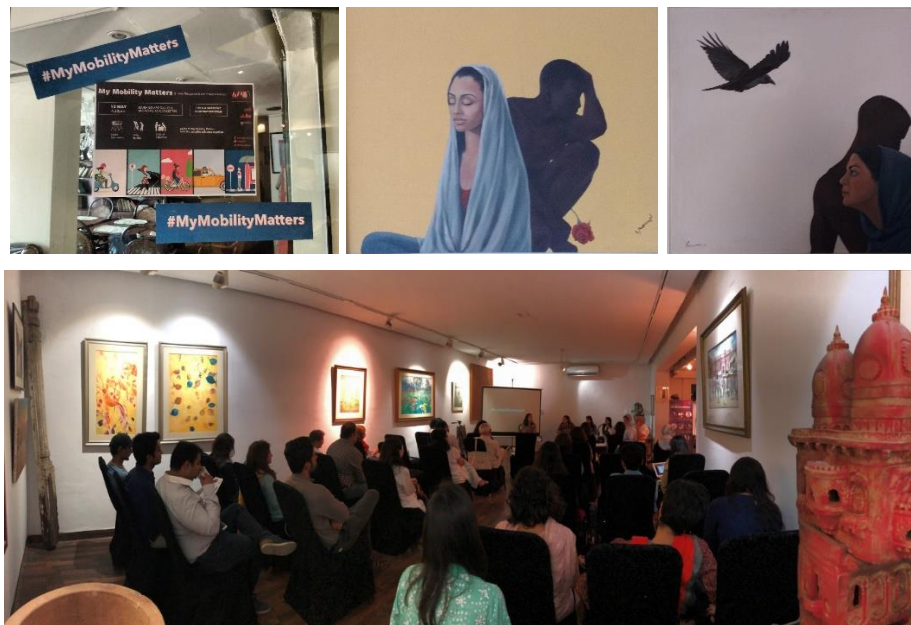


FIGURE 9. World café held in Lahore, hosted by WEMOBILE partner DesignPak (Photograph: WEMOBILE project, 2018)

## RESULTS

### Online survey

Of the 47 responses received, seven were from men (not the target audience of the survey). Of the respondents, 64% were in full-time employment while 32% were students. Most of the female respondents did not own private vehicles and were therefore either dependent on public transport or other family members for their mobility needs. They reported that they would have liked more frequent buses. Women were dissatisfied with public transport (in terms of availability and levels of sexual harassment). They experienced incidents of sexual harassment from fellow passengers (19%), vehicle driver/conductors (27.5%) and other road users (32%) (Figure 6). Harassment typically took the form of staring and lewd comments, touching/groping and being followed. Just over two-thirds of women ignored such harassment, with 27% confiding in friends or family. None of the respondents felt safe walking to a bus stop after daylight. The overcrowding, shortage of buses and harassment contributed to women having to spend 20–40% of their income to travel in safety using ride-hailing services, whereas men spend 10% of their income on buses, cars and motorbikes. One (female) survey respondent commented: “...if I ever have to use public transport which is extremely rare, then I face the discomfort of the misogyny that surrounds us on the streets and public spaces”.

Additional comments illustrated that women were not only threatened by the attitudes of men but also by the social stigma their mobility created, with comments on *‘the narrow-mindedness in the society’* and the *‘social opinion of other women’*. If working women were perceived as having had to use public transport, they were looked down upon by their colleagues. Given the heat, dirt and poor maintenance of buses, clothes quickly become crumpled and unclean. Additionally, if women had to work late at night (i.e. after sunset), public transport becomes more unsafe, and they were branded as being of ‘ill repute’.

The top four worries for women when travelling were harassment, being late, travel expenses and time constraints. In contrast, men mentioned the condition of the roads and noisy traffic. Additional

barriers included *'household responsibilities'* and *'wasted time'* — incurred due to the dependency on and availability of others.

**Table 1:** Harassment faced by women in different modes of transport (Data collected: WEMOBILE project, 2018)

Forms of transport	NUMBER OF PARTICIPANTS	PERCENTAGE OF TOTAL PARTICIPANTS
<i>On the bus</i>	12	16.9
<i>On the rickshaw</i>	11	15.5
<i>On Quigqi</i>	8	11.3
<i>Walking</i>	23	32.4
<i>On private transport</i>	9	12.7
<i>None of the above</i>	5	7
<i>Other</i>	3	4.2

### The World Café in Lahore

The moderated stakeholder conversations (Figure 10) revolved around sharing individual perspectives from different sectors and backgrounds, exploring the different barriers and challenges women face, evaluating existing solutions and brainstorming possible solutions for improvement in the future.



**FIGURE 10.** Moderated discussion and representative sketch of items discussed in the World Café (Photograph: WEMOBILE project, 2018)

Highlights from the moderated panel discussion included the following:

Unfortunately, the fact is that the government has never taken these issues as seriously as they should have, where 48% of our population is women, where we mostly have them as you know, wives or sisters or daughters or mothers but the economic participation and to give them a prominent role in our society and on autonomy, there has never been an initiative... (Director General Chief Minister's Strategic Unit and initiator of 'Women on Wheels')

My stance has always been that women-only services, women-only buses, women-only bus stops cannot be the only solution to move this society forward... Since women are more prone to use public transportation, Careem's 80% base is women. (Experience Manager, Careem)

It was agreed that

- Mobility was a significant challenge for women, which needed to be addressed at governmental, private, not-for-profit and civic levels.
- Although women relied more on public transport, their needs were not being met.
- To advance women's mobility, a willingness was needed from all sectors to collaborate.
- An increase in female representation in government and the private sector could help bring forward women's perspectives.
- Civic organizations needed to be supported, as they play a crucial role in providing focused and targeted innovation for different communities.
- All-women buses and transport modes, despite having good intentions, failed to improve women's mobility.

### Findings from the focus groups

Group discussions were conducted (Figure 8) based on four key areas relating to women's mobility: challenges/issues; journeys; changes in mobility over time; and possible solutions. Key points related to a lack of safety on streets and public transport; the amount of time women spent planning trips, especially if they had complex journeys or were financially constrained or dependent on family members; and class-based issues related to car ownership and usage.

Given the demographics of the participants in the research, the team concluded that the mobility of women in lower to upper-middle economic classes (with family income Rs 45,000–300,000 per month) is adversely impacted in the following ways:

- Social and cultural factors
  - Effects on the mobility of women in the public realm and on public transport through harassment, physical assault, theft and a pervasive hostile atmosphere. This results in fewer women venturing out of their houses.
  - Effects on mobility patterns because of women's roles as primary caregivers and housemakers. This severely restricts the time and location of employment.
  - Lack of agency and independence. Women must seek permission to leave the house and to take up employment. Permission may be denied for certain activities, for example, recreational trips and journeys at night.
  - Women from more liberal households must adjust their behaviours when moving in more conservative circles (slut shaming).
  - Lack of female role models
- Safety issues
  - Women are in a state of constant fear in the public realm and remain hypervigilant.
  - Female apparel leads to injuries on transport, impeding movement and getting caught in motorcycle wheels.
  - Lack of law enforcement and regulations protecting women.
- Health issues
  - Exposure to pollution from transport and construction.
  - Lack of exercise and vitamin D deficiencies because there are no opportunities to use active modes of transport.
- Economic issues
  - Classism. Urban centres like Lahore require people to present an image that is beyond their financial means to support. Women who travel on public transport have to hide the fact that they journey to work in this manner.



- Upper-middle-class women choose to have cars to overcome the mobility barriers they face.
- Careem (on-demand transport service) is expensive, but it is the safer alternative for women's travel. However, it is not regularly affordable.
- Lack of investment in public transport.
- Urban planning and architecture factors
  - Lack of accessibility on roads, buses and buildings for those with disabilities.
  - Few pedestrian walkways and few crossroads.
  - Lack of education/awareness about new transport infrastructure (e.g. signalling).
- Transport issues
  - In car-owning households, males take priority in using the car and are considered experts in driving and car maintenance.
  - Women feel uncomfortable in classes and workshops relating to car maintenance and motorcycling.
  - Window screens are used on cars, so female occupants are hidden.
  - Lack of integrated public transport services and route coverage
  - Lack of information about bus services in terms of payment, routes and timetables. Information is disseminated by word of mouth.
  - Harassment on transport and while waiting for transport, on pedestrian bridges and in the public realm.
  - Lack of investment in pedestrian infrastructure, leading to poor maintenance, litter, disconnected pathways and dangerous walkways exacerbated by poor lighting.
  - Poorly designed bus stops located far from residential areas.
- Regulations. Lack of awareness or implementation of regulations that could be used to reduce transport inequality
  - Article 9: *Security of Person* reads, 'No person shall be deprived of life or liberty save in accordance with the law'.
  - Article 15: *Freedom of Movement* reads, 'Every citizen shall have the right to remain in, and subject to any reasonable restriction imposed by law in the public interest, enter and move more freely throughout Pakistan and to reside and settle in any part thereof'.
  - Article 25: *Equality of Citizens* reads, 'All citizens are equal before the law and entitled to equal protection of the law. There shall be no discrimination based on sex alone. Nothing in the Article shall prevent the State from making special provisions for the protection of women and children'.
  - Article 26: *Non-discrimination in Respect of Access to Public Spaces* reads, 'there shall be no discrimination against any citizen on the grounds of race, religion, caste, sex'.
- Political or governmental factors
  - Lack of female representation in policymaking and government.
  - Lack of gender mainstreaming and gender action planning.
  - Critical need for recognition of women's mobility needs.
  - Need for the inclusive design of urban and transport infrastructure.
  - Need for more empathic approaches in design and development.
- Environmental and climatic factors
- Extreme hot weather makes it difficult to walk outside.
- Rural areas and villages inaccessible for public transport.

## PROJECT OUTPUTS

The previous section demonstrated that the results from interviews, discussion groups, journey maps and our experiences triangulated and concurred with previous research, providing compelling accounts of gender transport poverty in Pakistan. The aim of the WEMOBILE was not just to experience and

record such experiences but also to re-present these facts in ways that could be utilised to facilitate change.

Adopting a systemic design approach to wicked problems gives the designer the opportunity to visualize user data and transform that data into relevant information that supports effective design decision-making, not only in terms of the design of artefacts but also in terms of the design methods, questioning and engagement with multiple stakeholders. The debates on problems of ageing, sustainable energy and transport design provide a ‘practical problem-solving epistemology’ (Jones, 2014). Cross (2001, p. 51) explained:

So we might conclude that design science refers to an explicitly organised, rational and wholly systematic approach to design; not just the utilisation of scientific knowledge of artefacts, but design in some sense a scientific activity itself.

This section discusses the rationale behind the creation of two tangible outputs from the project: personas and systemic maps.

### **Personas**

During the early stages of design, frequent use is made of personas to represent typical end-users. Personas create reliable and realistic representations of key end-users. They are used as a method for enhancing engagement with users and form a foundation on which to start thinking about users (Grudin & Pruitt, 2003). They are constructed from discussions on the outcomes of qualitative research in which material is condensed into critical themes and characteristics, brainstormed and outputs are refined into rough personas with identifying characteristics (as described at usability.gov). Personas can engage design team members quickly when they must think about designing for populations dissimilar to themselves. Therefore, personas can be a way of summarising in a concise and ‘user-friendly’ way information from ethnographic studies, which, although impactful and interesting, may not be of practical use in high-pressure environments.

Table 2 shows the first stages in developing personas from the primary data collected in WEMOBILE, mapped onto the ten phases of women in LMICs, highlighting mobility changes and challenges over a typical lifespan. This construct is a generalisation; lives are complicated and impacted by social, cultural, political and economic factors. In each age group, mobility, barriers, primary occupations and roles differ. This table can be used by designers and planners as a starting point to develop their personas and discuss women’s mobility needs. The ‘ten phases of women’ (from the cradle to the grave), provide a contrast to ‘the seven ages of men’ (adapted from William Shakespeare’s ‘All the world is a stage’), are commonly adopted to represent age-related changes in men graphically.

Meanwhile, images depicting ‘the seven ages of women’ are less frequent. Critically, culturally specific personas are also rare. Table 2 also extends the number of stages from seven to ten, acknowledging changes to life span and additional impact factors in later life. This was developed from data from Pakistan but was validated and checked against data gathered in Malaysia. This approach is essential because it provides a much needed, culturally specific representation of women in Pakistan, which was lacking when this research was initiated.

Women’s lives tend to be more holistic in terms of who they care for (e.g. children, aging parents) and the need to blend a professional career with family life (referred to as the dual burden). This along with the physical and psychological changes leading to a more complex set of phases compared to typical men. The expansion from seven to ten phases acknowledges this complexity. The mobility pattern also differs for women belonging to different economic classes and financial backgrounds.

**TABLE 2.** Ten phases of women: Specific impact factors (WEMOBILE project, 2019)

Phase	Age range	Impact factors
1	0–3 years	Home-based, family centric, egocentric
2	4–6 years	External influences, begin questioning, collective identity, socialisation
3	7–12 years	Developing a personal consciousness, more aware of other cultures, developing personal network
4	13–17 years	Hormonal changes, sense of sexuality, developing sexual identity, beginning of conversation about marriage, developing personal identity
5	18–24 years	Quest for higher education (optional), dual role begins, divide between the wealthy (going to university) and/or getting a job, pressure to marry (postpone or avoid situation by becoming a student)
6	25–34 years	Life decision to pursue family and/or professional career, going through pregnancy and giving birth, becoming a mother, sensitivity to caring and protecting others
7	35–44 years	Life choices become solidified (harder change to path), children are becoming independent, parents are becoming older and begin to need care
8	45–60 years	Physical, emotional and psychological changes and challenges, hormonal changes, experience seeking
9	61–70 years	Become reflective, sensitivity to years of life left
10	71+ years	Acceptance of one life, later chapter of one's life

From this, Table 1 was developed, showing female personas for Pakistan. This represents experiences of middle to upper-middle-class women annually (not more than two children) with an income of US\$9000 and above. The stages are divided into two main categories: (i) dependent and (ii) self-sustaining/self-reliant phases.

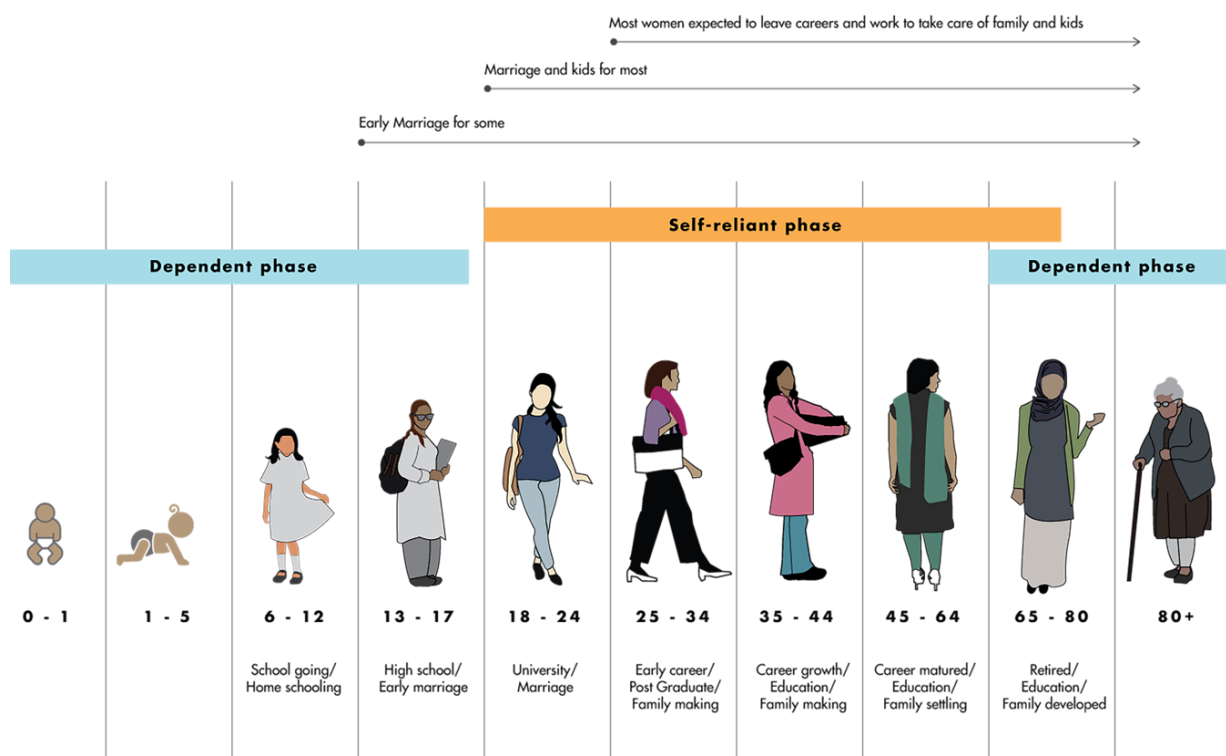


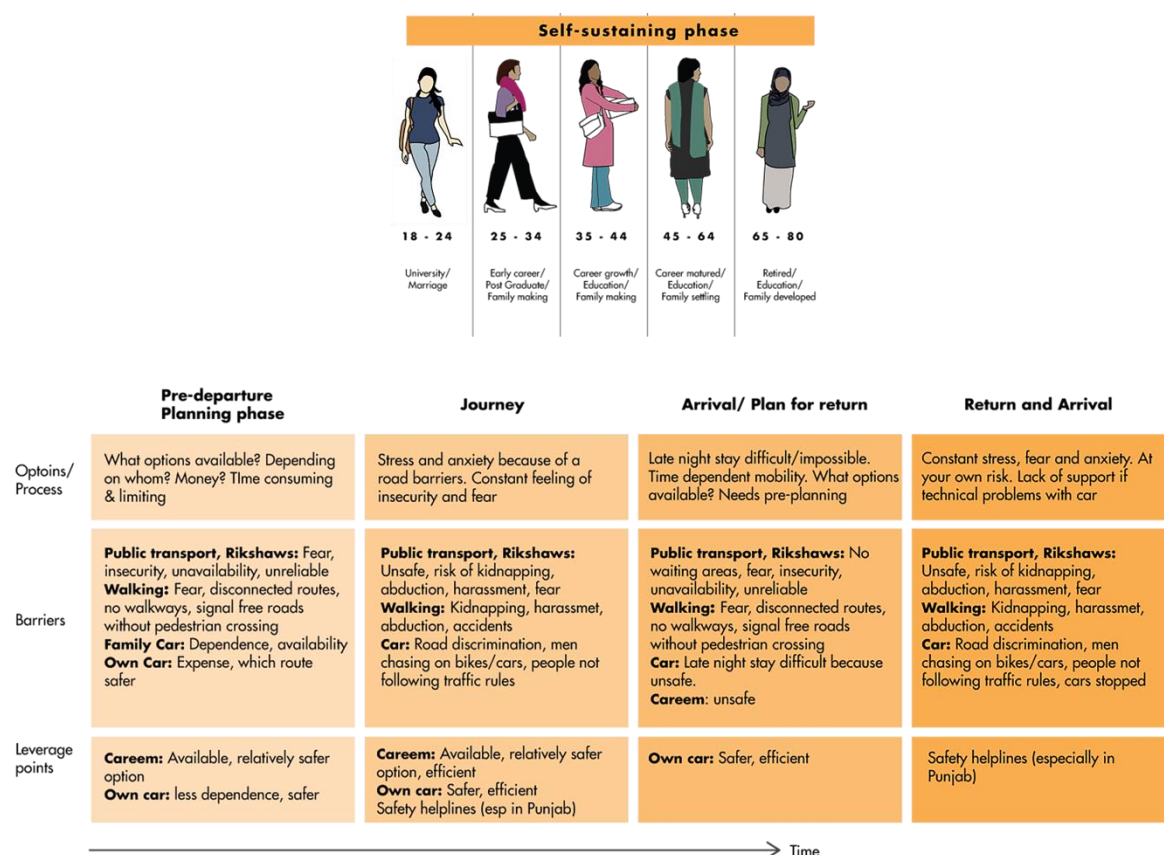
Figure 10: Depiction of ten stages of women (Illustration: Faiz, 2018)

In all stages, a mix of private, public transport and on-demand transport can be used, subject to financial and time constraints and the permission of family members for travel (e.g. to places of employment and trips with trains). With inadequate public buses (and no inner-city trains) and without personal forms of transport, women's mobility is significantly limited. Walking is stressful because of the climate, lack of safety, lack of pedestrian infrastructure and hostile environment. Harassment on buses, at bus stops and while walking on roads was reported to be the most significant barrier to women's mobility. The founder of Rides and Miles (female motorcyclist training academy), herself a motorcyclist, shared the following experience:

I was riding my bike yesterday, and two boys were crossing me and cat-called on me saying, 'Darling, where are you going?' Harassment is a big issue in Pakistan, especially if you are travelling on a bike. In my routine life, if I go out of my home twice or thrice, I face harassment twice or thrice too, whether it's through words or eyes.

The experience of the research team showed that this was not an option. Women in employment will choose to use more expensive ride-hailing services. For this income group, there will likely be a car in the household (for the use of male household members), and men will also use motorbikes to travel to work to avoid congestion.





**Figure 11:** Characteristics of the self-sustaining phase, broken down across journey stages (Illustration: Faiz, 2018)

The family further curtails women's mobility in the middle stage of their life. Societal expectations are that women will get married and move in with their spouse or spouse's family. A small proportion of women may obtain a driving licence and buy a car, which increases mobility. Those not in this position remain dependent on their fathers, husbands, brothers and sons for transport and need their permission to travel. Streets, transport and buildings are not 'buggy friendly', making it clear that a woman's place is in the home. Women are responsible for looking after the house, elderly relatives and children. They have to not only arrange their travel but also accompany or plan the safe travel of their dependents. Because they also have to schedule housework, their employment opportunities are severely limited, as most employees do not have child-friendly working practices or nearby day-care centres. Unreliable, inaccessible and unsafe transport add significantly to a woman's everyday burdens in the 'independent' phase of her life. Figure 11 summarises this, showing the characteristics of the self-sustaining phase in terms of transportation options, barriers and leverage points. Typically, women require more time to plan for their trips, which often results in inconvenience and stress and may lead to perceived unreliability and cancellations. Planning includes negotiation within the family for the use of the car, chaperoning or lifts and contingency plans, having enough money for rideshares (Careem or Uber) and contingency plans for inflated charges, harassment inside the vehicle and arranging safe pick-up points.

This section has illustrated how the qualitative data generated within WEMOBILE has enabled the development of tools to help designers, transport planners and operators understand more about women's lives and the role of transport at different stages of their lives. This method of depiction may lack the immediacy and impact of personal narratives, but it fits in more closely with how designers work — using personas and visual representations to understand the needs and requirements of groups that may be alien to them. Figures 10 and 11 show where design and planning opportunities might exist.

## Systemic synthesis

To gain a more holistic view of the data, a systemic synthesis was applied to the results. This can be described as a way of '[synthesizing] separate findings into a coherent whole' (Braun, 2002; Gharajedaghi, 2011, p. 89; Jones, 2014). It is especially useful for designers and those working on 'wicked problems' to uncover recurring patterns of behaviour (known as archetypes), which drive systems, and which may cause them to fail.

The system maps were developed using cluster mapping (Acaroglu, 2017), in which key elements, agents, actors, nodes, elements and themes derived from the qualitative research are brain dumped onto large sheets of paper, and connections/relationships are drawn between them. To exemplify the usefulness of this method for studying gender transport poverty, the ten stages of women example has been used to show interconnections and linkages. System maps were created using information from the literature review, participatory sessions, focus groups, auto-ethnography and in-person interviews. Anecdotal information from representatives from the private, public, governmental and civic sectors helped connect the pieces of information from various perspectives to develop an organic visual representation.

A systemic causal loop diagram (Gharajedaghi, 2011) was constructed to provide stakeholders with an overview and shared understanding of the problem space and to see where interventions could be made and why current ones are not successful. In the current example, the starting point for Figures 12 and 13 was the identification of the ten stages of women and the dependent and independent phases of women's lives (labelled (a) and (b)). These are both connected to whether a woman can or cannot drive (labelled (c)). Such women form approximately 95% of the population. The more a woman can travel and experiences problems with transport, the more she will appreciate having a vehicle. Where this is not practicable owing to social taboos or lack of financial resources, her safe independence comes at a cost; she is forced to either continue to put herself at risk and suffer harassment or to use ride-sharing or on-demand services with unregulated fares or depend on male family members. She is trapped in a circle of gender transport poverty, where life chances slowly erode. She must spend more effort in planning journeys, negotiating her mobility, paying more for transport and being constantly vigilant on arduous journeys to and from employment. On top of this, she will also be responsible for household duties.

In the case of the 'can drive' (d) cycle, a female driver faces misogyny and hostility from other drivers, congestion and the poor driving of other motorists. She will either adapt (e.g. by not slowing down when driving late at night or stopping at junctions or by using window blinds to hide her face) or become so fearful and insecure that she gives up driving. Listening to such experiences might discourage women from learning how to drive or purchasing vehicles and reinforces the view that women should not be present in the public realm.

Walking and cycling are not options for women, the latter owing to social taboos. Due to climatic conditions, poor roads, pedestrian infrastructure and urban planning together with high levels of crime and harassment, this is the most unsafe and uncomfortable option for any woman. The majority even avoid walking in marketplaces or malls.

The systems map helps to show that women's mobility is a wicked problem that cannot be solved with straight-forward and apparent solutions. Strategic thinking is required, keeping in mind the many consequences that may result from an action intended to solve one part of the problem. Policymakers need to appreciate the narrative of women when designing solutions, recognising, for example, the differences in journeys made by women at different times of their life (Table 1). Addressing gender transport poverty requires an inclusive strategy catering to all women and the needs of their different journeys. For example, a homemaker will appreciate a bus stop near her home, with well-maintained and regulated streets so that she can walk to and from public transport in safety. A working woman who owns a car will need helplines in case of emergencies, so she will not be stranded or fearful of abduction, as well as lessons in car maintenance (which occur in gender-sensitive environments) and safe places to park the car.

Figure 12 depicts the interaction of women in the self-reliant phase, between 18–68 years of age, through a systemic lens, highlighting cause-and-effect relationships, gaps in the existing system and

the impact of different elements. It identifies the compound nature of problems and the different ways in which factors play out in different scenarios. Fear seemed to be a common theme in the topic of women's mobility. However, the fear experienced differs with context and may require different solutions. For example, in the independent phase of her life, a woman riding a bus will fear being harassed at a bus stop or the bus not stopping for her. Inside the bus, she will be afraid of harassment from male passengers (e.g. touching, leering and lewd comments), having to challenge men who sit in the women's compartment, safety and cleanliness and overcrowding. She will also be fearful of punctuality and getting off the bus quickly. A woman using the Careem or rideshare options will fear being kidnapped with nowhere to get immediate help when she is in a vulnerable state in someone else's car. She may also worry about having to negotiate inflated prices for her ride (as these are not regulated and not adhered to). A woman driver may fear being chased by men in cars at night and carjacking; she may also worry about damaging the car and safety when parking. Sharing these worries or experiences with family members could result in her independence and agency being taken away.

Fear of harassment is different in all these situations and requires different solutions. Importantly, the solutions would benefit all citizens (e.g. regulating traffic would reduce road traffic accidents; providing training in car maintenance would improve the longevity of vehicles and reduce household costs; street maintenance would benefit all pedestrians).

Figure 13 concentrates on government interventions and their limited effectiveness in terms of their disconnect with other gender-related issues associated with mobility (e.g. bus services are improved, but harassment issues are not addressed; buses are added with little thought about interconnectivity). For example, one government initiative was to introduce female traffic police. The comment below illustrates the failure of this approach. Such a job would be difficult for a man, as there is so little adherence to traffic regulations, and giving such a job to a woman without empowering women and teaching respect for them (within the police force and wider society) was doomed to failure.

It was very difficult to stand on the roads and manage the traffic. People wouldn't obey the instructions, also a lot of men on bikes and cars would harass us and would stop their vehicles to talk for no reason. There were catcalls. There was one time, a guy yelled 'go home! This is not your job. (Female Traffic Warden)

However, the government's Women-on-Wheels project has been a significant success. It encourages women to ride bikes, provides easy instalment packages to buy one and advocates for their safety and freedom. In the panel discussion, there were some negative comments that, although women signed up for the project, many were discouraged from attending because of a lack of support from their families. Such a scheme also needs to be reinforced by making the transport environment and its users less hostile to women through increased regulations and strenuous multi-agency efforts to increase gender equality.

Figure 14: Systems causal loop diagram linking the ten stages of women and the issues they face

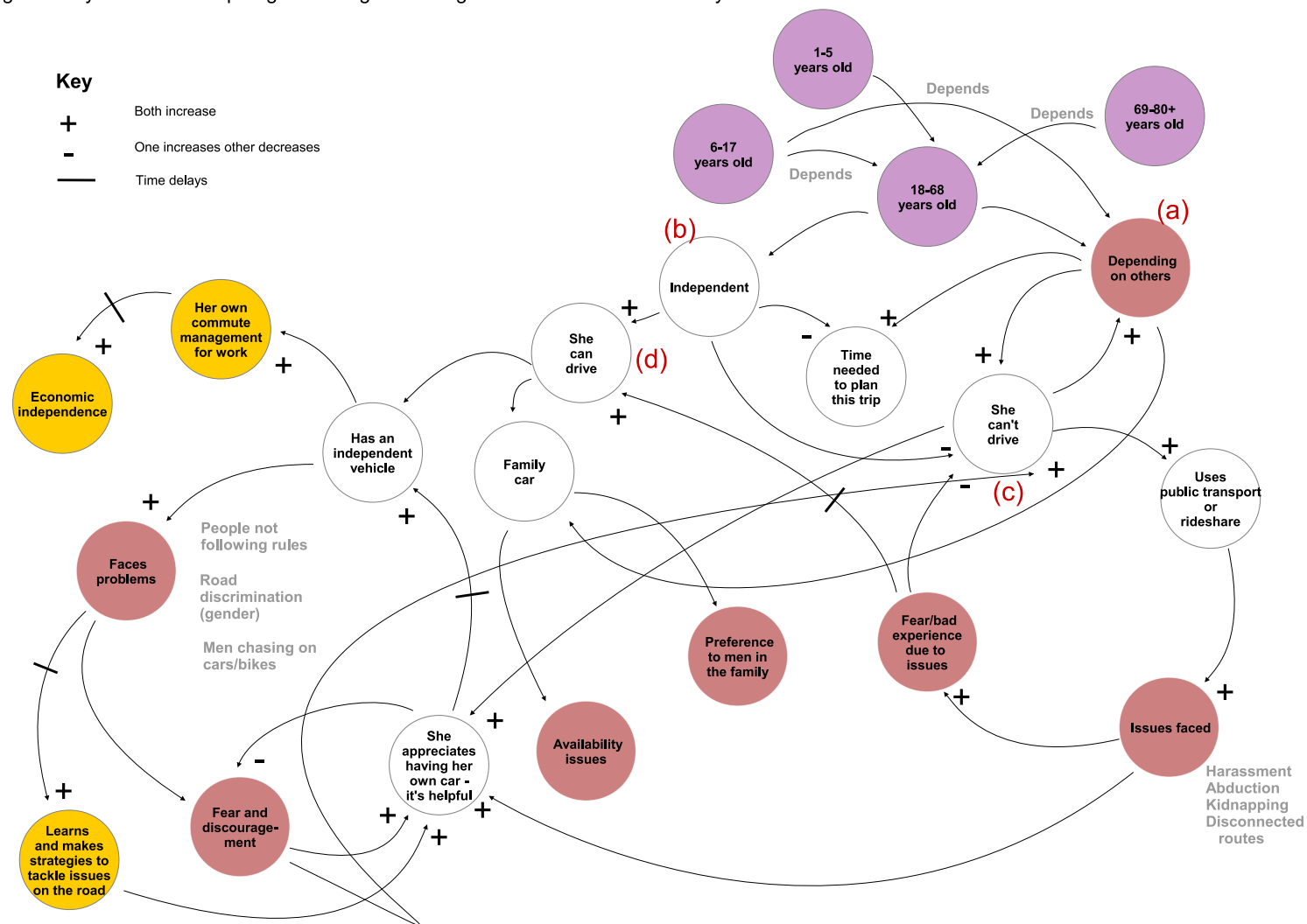


FIGURE 12: Systems causal loop diagram linking the ten stages of women and the issues they face (Faiz, 2019)



There is a tendency for private, public and governmental sectors to work independently with no collaboration and to discredit each other's work instead of building upon it. The not-for-profit sector attempts to intervene in the issues of harassment and safety through awareness campaigns, research projects and protests. However, these actions can only work if the government incorporates them into more extensive long-term plans (e.g., in relation to safer cities and far-reaching educational programmes). Quick wins are useful and should be celebrated. They represent grassroots support and activism for change. However, fundamental change is needed over many generations to embed gender equality and mainstreaming in the culture and remove social taboos.

These brief examples have shown how systemic design maps could be used to investigate issues around gender transport poverty in Pakistan, in an easily comprehensible format. Going one step further, the team compared their diagrams against recurring system archetypes (see, e.g. Acaroglu, 2017; Bocken et al., 2014; Kim & Lannon, 1997) to discover systemic failures behind attempts to solve gender transport poverty as experienced by women in their everyday lives, finding examples of siloed problem solving (Braun, 2002; Tippmann et al., 2012) and dependency cycles.

The government interventions in public transport provision may be regarded as examples of siloed problem solving, which fail to address the wider issues of gender transport poverty, such as the use of segregation, as highlighted by small female-only compartments on buses (only one-third of the available space is allocated to women) and 'pink' women's only buses (Punjab Government Office, 2018). These solutions involve simply putting a 'sticking plaster' on the problem and do little to address the wider issues of gender inequality. Indeed, they perpetuate it, as they do not acknowledge that women have equal rights to use public transport. In 2013–2018, bus routes were extended, increasing the number of buses and introducing faster service (Punjab Safety, 2018). No attempt was made to use this as an opportunity to improve safety and security on vehicles or on the walkways leading to them. As part of this initiative, improved lighting, bus stops and surveillance cameras could have been introduced, the routes could have been integrated with the rest of the services and female operators could have been introduced along with better training of drivers. Underlying issues relating to equality, safety, harassment and theft, although identified, were not addressed. Meanwhile, not-for-profit organisations focused on raising awareness about harassment and safety issues but had no voice in policymaking and transport planning.

These siloed approaches lead to piecemeal solutions of limited effect. At a general level, this may be addressed through the development of a master plan, with stakeholder/interagency buy-in from the start, development of a clear strategy, a route map and an implementation plan. When a transport plan is being created, there needs to be a clear and consistent strand of activity that sets clear targets for reducing gender transport poverty. The gender theme within transport could feed into more comprehensive plans for reducing gender inequality.

Two types of dependency cycles were noted: women know how to drive but are dependent on other family members for car availability; women cannot drive and are dependent on public and public-private modes of transportation. Dependency is culturally generated. Deeply rooted cultural norms and patriarchy in Pakistan play into transport. In most households, women lack agency. They must ask for permission to go out or to get a job. Malik (2014) noted that 'gender discrimination and hegemonic trends in relationships and institutions are still very rigid and unbending as in olden times'. Permission to leave the house or take up employment is usually denied, as it is considered a man's duty to provide for the women in his household. Women who stay out for a long time and are outgoing are regarded as unchaste and of ill-repute and bring shame to their families — even if they are only going to and from work. Moreover, if they work, they still have to fit in all their household duties — a burden few men share. In restrictive households, permission is denied, and when women challenge this, they are mistreated. It is estimated that 70–80% of Pakistani women experience some form of domestic violence. There is no punishment for the perpetrator, and indeed the abused woman is herself blamed for behaving in ways that have caused her to be abused.

Figure 15: Areas of government intervention

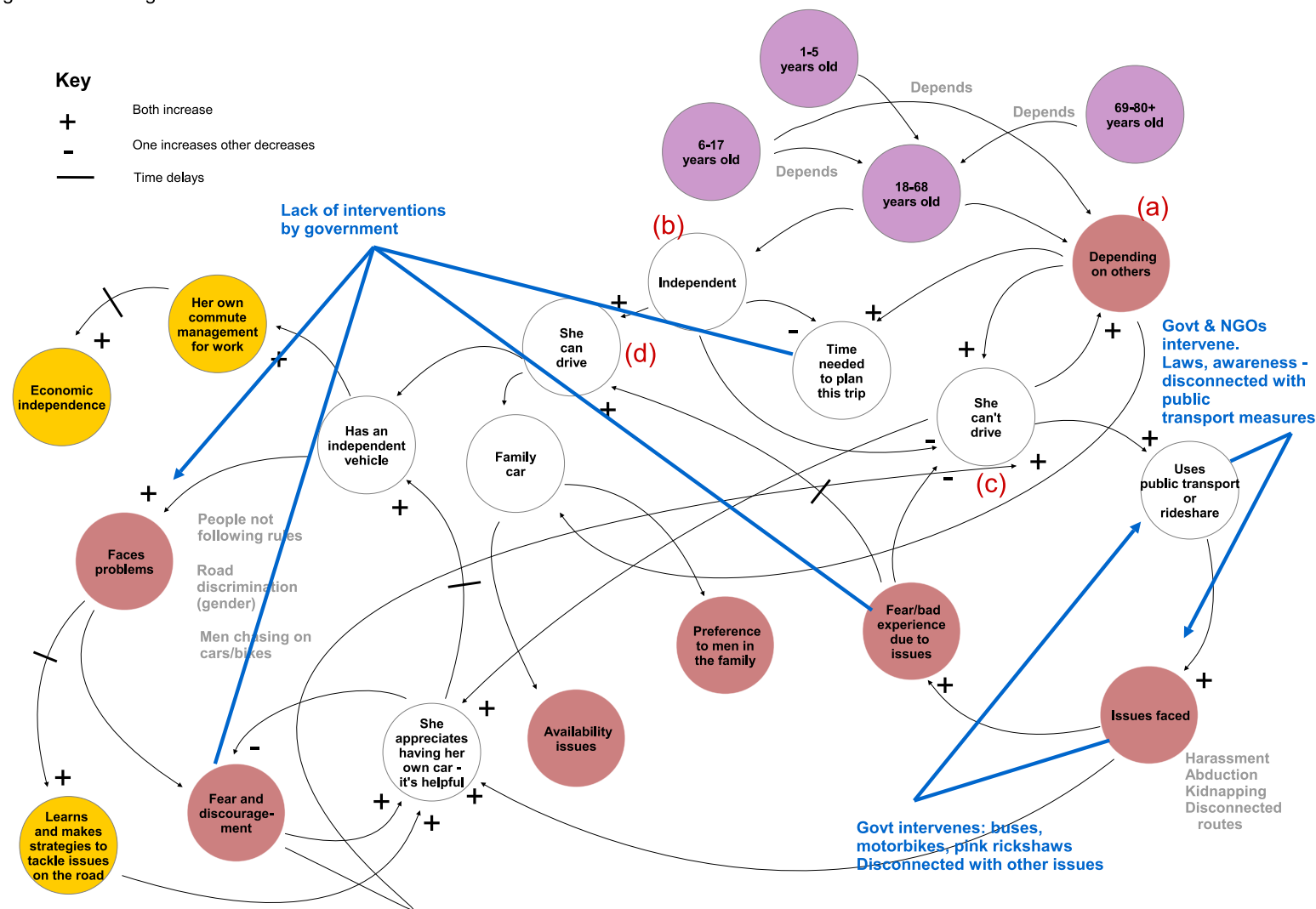


FIGURE 13: Areas of government intervention (Faiz, 2019)

## CONCLUSIONS

Gender transport poverty in Pakistan is a by-product of entrenched gender inequality. Reducing this requires long-term strategic, national goals with short-, medium- and long-term plans aimed at reducing gender inequality across Pakistan. Although transformational changes are slow, requiring changes in hearts, minds and behaviours, they are not impossible. A recent example in the field of transport is the widescale, global embracing of sustainable forms of transport, which has buy-in from global corporations, investors, government, public, manufacturers, transport providers and users

Examining gender transport poverty as a wicked problem — as both a societal and transport system failure — enables system archetypes to be applied. Evidence was found of ‘eroding goals’, ‘seeking a wrong goal or something that is achievable while not tackling the larger problem’ (Acaroglu, 2017), ‘shifting the burden’ (putting the burden of change and improvement on someone else or another agency), ‘fixes that fail’ (solutions that fail to solve or improve the problem), ‘limits to success’ (limitations that do not allow interventions to succeed) (Braun, 2002), knowledge transfer system failures and the use of positive system archetypes.

In terms of the latter, the WEMOBILE team’s approach has led us to the conclusion that positive system archetypes relating to ‘intensity to action’ (in which agents are motivated to take action for the collective good, e.g., in terms of support of sustainable transport, lift-sharing) and ‘status quo disruption’ may be of value in the following ways:

Supporting intensity to action was demonstrated by:

- The basic understanding displayed about women’s mobility problems and willingness to talk about them publicly.
- The willingness to try piecemeal solutions.
- The effects of gender transport poverty on limiting the life opportunities of women and their contributions to household and national economies being noted in other LMICs.
- Stakeholders from public and private institutions and NGOs being willing to support, contribute to and work towards improving mobility for women, although dialogic processes and iterative enquiry are lacking.

‘Status quo disruption’, in which transport and mobility can become ‘thought and practice’ leaders for gender equality, can draw on the following:

- The global trends in transport towards accessible, usable, safe, inclusive and joined-up transport services. Tools (such the Sustainable Urban Mobility Planning Guidelines, Rupprecht Consult, 2019) have been developed to support local authorities to develop and deliver on a transport master plan, which have succeeded in attracting investment. These plans are built on the core need to understand the requirements of all users.
- Global initiatives to improve gender equality, which include access to opportunity, through improved transport and mobility.
- Evidence-based practice, which shows the effectiveness of gender mainstreaming and gender action planning for improving organisational performance and reducing systemic inequalities, and the development of useful tools to support such practice (e.g. Asian Development Bank, 2013; European Institute of Gender Equality Resources).

In conclusion, the project has provided resources for designers and others to address the transport requirements and mobility needs of women in LMICs. In this, we have stressed the complex nature of women’s lives and the problems that access to adequate, safe transport may pose for them when balancing work and home life. Further, we have demonstrated how qualitative research can be transformed into system maps and the value of such maps for understanding systems-level problems. Finally,

we have outlined opportunities for how gender innovations in the transport sector could lead to disruption of the current status quo in terms of gender inequality in Pakistan.

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## REFERENCES

- Acaroglu, A. (2017). Tools for systems thinkers; Systems Mapping. *Disruptive Design*.  
<https://medium.com/disruptive-design/tools-for-systems-thinkers-systems-mapping-2db5cf30ab3a>
- Adeel, M., Yeh, A., & Feng, Z. (2014). Gender, mobility and travel behaviour in Pakistan: Analysis of 2007 time use survey. In *The 5th International Conference on Women's Issues in Transportation, 31-4 "Bridging the Gap" 5th International Conference* (pp. 31–46).
- Anand, A., & Tiwari, G. A. (2006). Gendered perspective of the shelter–transport–livelihood link: The case of poor women in Delhi. *Transport Reviews*, 26(1), 63–80. <http://dx.doi.org/10.1080/01441640500175615>
- Asian Development Bank. (2013). *Gender toolkit: Transport*. <https://www.adb.org/sites/default/files/institutional-document/33901/files/gender-tool-kit-transport.pdf>
- Bevan, M. T. (2014). A method of phenomenological interviewing. *Qualitative Health Research*, 24(1), 136–144. <http://dx.doi.org/10.1177/1049732313519710>
- Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56. <http://dx.doi.org/10.1016/j.jclepro.2013.11.039>
- Braun, W. (2002). The system archetypes. *System*, 27. [http://my2.ewb.ca/site\\_media/static/attachments/group\\_topics\\_grouptopic/86984/systemarchetypes.pdf](http://my2.ewb.ca/site_media/static/attachments/group_topics_grouptopic/86984/systemarchetypes.pdf)
- Brown, J. (2010). *The world café: shaping our future through conversations that matter*. <https://www.ReadHowYouWant.com>
- Bureau of Statistics. (2018). Statistical pocketbook of the Punjab. Retrieved February 11, 2019, <http://bos.gop.pk/PocketBook>
- Burns, D. (2007). *Systemic action research*. Policy Press. <http://dx.doi.org/10.2307/j.ctt9qgvn5>
- CiViTAS WIKI Policy Note (2015). *Gender and equality and mobility: Mind the gap!* Retrieved May 2019 from <https://civitas.eu/content/civitas-policy-note-gender-equality-and-mobility-mind-gap>.
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among the five approaches*. SAGE Publications.
- Cross, N. (2001). Designerly ways of knowing: Design discipline versus design science. *Design Issues*, 17(3), 49–55. <http://dx.doi.org/10.1162/074793601750357196>
- Dunckel-Graglia, A. (2013). Women-only transportation: How “pink” public transportation changes public perception of women’s mobility. *Journal of Public Transportation*, 16(2), 85–105. <http://dx.doi.org/10.5038/2375-0901.16.2.5>
- Ellis, C., Adams, T. E., & Bochner, A. P. (2011). Autoethnography: An overview. *Historical Social Research*, 36(4), 273–290. <http://www.jstor.org/stable/23032294>
- ETF. (2018). *Declaration on equal opportunities for women and men in the transport sector*. [www.etf-europe.org/wp-content/uploads/2018/09/EU-Declaration-equal\\_opportunities-EN.pdf](http://www.etf-europe.org/wp-content/uploads/2018/09/EU-Declaration-equal_opportunities-EN.pdf)
- European Institute of Gender Equality. (2017). *Gender in transport*. <https://eige.europa.eu/publications/gender-transport>
- Gharajedaghi, J. (2011). *Systems thinking: Managing chaos and complexity: A platform for designing business architecture*. Elsevier.
- Gil, N. (2018). *Road rage is sexist and these female drivers know it*. <https://www.refinery29.com/en-gb/2018/11/216815/road-rage-sexist-women>
- Grudin, J., & Pruitt, J. (2003). Personas; Practice and theory. In *Proceedings of the 2003 Conference on Designing for User Experience*. (pp. 1-15).
- Hoodbhoy, P. (2013, February 22). Women on motorbikes – What’s the problem? *The Express Tribune*. <https://tribune.com.pk/story/511107/women-on-motorbikes-whats-the-problem/>

- International Labour Office. (2011). *Decent transport for working women: Towards gender parity in Pakistan*. [https://www.ilo.org/islamabad/whatwedo/publications/WCMS\\_185253/lang--en/index.htm](https://www.ilo.org/islamabad/whatwedo/publications/WCMS_185253/lang--en/index.htm).
- Iqbal, S. (2020). *What makes women in Karachi transport poor?* (Unpublished PhD thesis). Coventry University.
- Jones, P. H. (2014). Systemic design principles for complex social systems. In G. Metcalf (Ed.) *Social systems and design. Translational systems sciences* (pp. 91-128). Springer. [http://dx.doi.org/10.1007/978-4-431-54478-4\\_4](http://dx.doi.org/10.1007/978-4-431-54478-4_4)
- Humayun, M. (2019). The Dua Mangi case: A glimpse into our society's rotten morals. *The Express Tribune Blogs*. <https://blogs.tribune.com.pk/story/91680/the-dua-mangi-case-a-caricature-of-our-societys-rotten-morals/>
- Kawulich, B. B. (2005). Participant observation as a data collection method. *Forum: Qualitative Social Research*, 6(2), article 43. <https://www.qualitative-research.net/index.php/fqs/article/view/466/996>
- Klaiman, D., & Guadarrama, G. (2016). *World cafe*. SFIN- 6020 Innovation Research Methods Course.
- Kim, D. H., & Lannon, C. P. (1997). *Applying system archetypes*. Pegasus Press.
- Lucas, K. (2012). Transport and social exclusion: Where are we now? *Transport Policy*, 20, 105–113. <http://dx.doi.org/10.1016/j.tranpol.2012.01.013>
- Madan, M., & Nalia, M. K. (2016). Sexual harassment in public spaces: Examining gender differences in perceived seriousness and victimization. *International Criminal Justice Review*, 26(2), 80–97. <http://dx.doi.org/10.1177/1057567716639093>
- Marcus, G. E. (1995). Ethnography in/of the world system: The emergence of multi-sited ethnography. *Annual Review of Anthropology*, 24, 95–117. <http://dx.doi.org/10.1146/annurev.an.24.100195.000523>
- Malik, A. (2014, December 6). Women and domestic abuse. *Pakistan Today*. <https://www.pakistantoday.com.pk/2014/12/06/women-and-domestic-abuse/>
- McDonagh, D. (2015). Design students foreseeing the unforeseeable: Practice-based empathic research methods. *International Journal of Education through Art*, 11(3), 421–431. [http://dx.doi.org/10.1386/eta.11.3.421\\_1](http://dx.doi.org/10.1386/eta.11.3.421_1)
- McLeod, E.D. (2018). *Pink public transport: A necessary evil?* Senior Projects Spring 2018. [https://digitalcommons.bard.edu/senproj\\_s2018/188](https://digitalcommons.bard.edu/senproj_s2018/188).
- Nawaz, M. (2019). An elegy of a patriarch: Boys will be boys by Sara Suleri. *International Journal of English Literature and Social Sciences*, 4(3), 548–555. <http://dx.doi.org/10.22161/ijels.4.3.2>
- Osmond, J., & Woodcock, A. (2015). Are our streets safe enough for female users? How everyday harassment effects mobility. In S. Sharples, S. Shorrock, & P. Waterson (Eds.) *Proceedings of the International Conference on Ergonomics & Human Factors 2015* (pp. 495–502). Taylor & Francis London.
- Pakistan Bureau of Statistics, Ministry of Statistics, Statistics Division. (2018). *Press release on provisional summary results of 6th population and housing census 2017* [Press release]. [http://www.statistics.gov.pk/assets/publications/Population\\_Results.pdf](http://www.statistics.gov.pk/assets/publications/Population_Results.pdf)
- Pakistan Bureau of Statistics. (2017). *Labour Force Statistics (2017-2018)*. <http://www.pbs.gov.pk/content/labour-force-statistics>
- Pakistan Bureau of Statistics. (2017). *Population and Housing Census*. <http://www.pbs.gov.pk/content/provisional-summary-results-6th-population-and-housing-census-2017-0>.
- Pakistan Council for Science and Technology web site: <http://www.pcst.org.pk/wst/index.php>
- Punjab Government Office. (2018). *Punjab Gender Parity Report 2018*. [https://pcsw.punjab.gov.pk/research\\_publications](https://pcsw.punjab.gov.pk/research_publications).
- Rand, M. W., McMillan, T., Lindsey G.-M., Nelson, B., & Mehranian, M. (2011). International Industry leaders Panel, Plenary Session 3. In *Proceedings of the 4<sup>th</sup> Women's Issues in Transportation*, Vol. 1, pp. 21-22.
- Rakodi, C. (1999). Cities and people: Towards a gender-aware urban planning process. *Public Administration Development*, 11(6), 541–559.

- Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, 4, 155–169.  
<http://dx.doi.org/10.1007/BF01405730>
- Rupprecht Consult. (2019). *Guidelines: Developing and implementing a sustainable urban mobility plan*.  
<https://rupprecht-consult.eu>
- Sajjad, F., Anjum, G. A., Field, E., & Vyborny, K. (2017). *Overcoming barriers to women's mobility*.  
<http://cdpr.org.pk/images/publications/cities/Overcoming-Barriers-to-Womens-Mobility-Extended-Brief.pdf>
- Saul, H. (2017). *The badge designed to tackle sexual harassment on public transport*.  
<https://inews.co.uk/news/badge-designed-tackle-sexual-harassment-public-transport/>.
- Schwartz, D. (1989). Visual ethnography: Using photography in qualitative research. *Qualitative Sociology*, 12(2), 119–154.
- Seedat, M., Mackenzie, S., & Mohan, D. (2006). Phenomenology of being a female pedestrian in an African and an Asian city: A qualitative investigation. *Transportation Research Part F Traffic Psychology and Behaviour*, 9(2), 139–153. <http://dx.doi.org/10.1016/j.trf.2005.09.005>
- STEM. (2018). *Women in STEM: Percentages of women in STEM statistics*.  
[www.stemwomen.co.uk/blog/2018/03/useful-statistics-women-in-stem](http://www.stemwomen.co.uk/blog/2018/03/useful-statistics-women-in-stem)
- Tanaka, S., & Muzones, M. (2016, October). *Policy brief on female labour force participation in Pakistan*. ADB Briefs. No 70. <https://www.adb.org/sites/default/files/publication/209661/female-labor-force-participation-pakistan.pdf>
- Thompson, D. M. (1993). The 'woman on the street': Reclaiming the public space from sexual harassment. *Yale Journal of Law and Feminism*, 6(4). <http://digitalcommons.law.yale.edu/yjlf/vol6/iss2/4>
- Tippmann, E., Scott, P. S., & Mangematin, V. (2012). Problem solving in MNCs: How local and global solutions are (and are not) created. *Journal of International Business Studies*, 43(8), 746–771.  
<http://dx.doi.org/10.1057/jibs.2012.25>
- Turnbull, P. (2013). Promoting the employment of women in the transport sector – Obstacles and policy options. *International Labour Office*. Working Paper, No 298
- United Nations. (n.d.). *Population*. [www.un.org/en/sections/issues-depth/population/](http://www.un.org/en/sections/issues-depth/population/).
- UN Women. (n.d.). *Women's safety audit in public transport in Lahore*.  
<http://asiapacific.unwomen.org/en/digital-library/publications/2018/05/womens-safety-audit-in-public-transport-in-lahore>
- US General Services Administration. (n.d.). *Improving the user experience*. <https://www.usability.gov/how-to-and-tools/methods/personas.html>.